OBSERVING THE OCEAN

From Niche to Norm

EVERY 10 YEARS, the ocean observing community gets together to take stock of what we have accomplished, where the new opportunities might be, and what innovation and improved collaboration could bring. The third such community-driven conference—OceanObs'19—convened in Honolulu, Hawaii, on September 16–20. Once again, it brought together people from all over the world to communicate the decadal advances made in ocean observing technologies and the remarkable science that observing networks have enabled—and to chart innovative solutions to society's growing needs for ocean information and ways in which collaborations can accelerate progress.

But how did we get there?

Looking back at the first conference, OceanObs'99, held October 17–22 in Saint Raphaël, France, it was a galvanizing force for the 300 attendees who all had interests in ocean observations and climate. That conference benefited from the just completed World Ocean Circulation Experiment (WOCE), which highlighted the acute need to collect data from the ocean more regularly and systematically in order to document its role in the climate system, to provide the data needed for emerging seasonal to interannual forecasting, and to improve understanding of ocean dynamics. Very quickly, this first OceanObs conference provided significant input into the rapidly growing Global Ocean Observing System (GOOS). The Intergovernmental Oceanographic Commission (IOC) created GOOS in 1991 in response to calls from the Second World Climate Conference (Geneva, 1990). The creation of GOOS was also spurred by the desire of many nations to gather the information required to improve forecasts of climate change, the management of marine resources, the mitigation of the risks of natural disasters, and the use and protection of the coastal zone and coastal ocean.

Ten years later, OceanObs'09, held September 21–25 in Venice, Italy, brought together more than 600 scientists to build a common vision for the acquisition of routine and sustained global information on the marine environment sufficient to meet society's needs for describing, understanding, and forecasting marine and climate variability and weather; sustainably managing living marine resources; and assessing longer-term trends. The community attending the conference expanded from largely physical oceanographers and carbon chemists in 1999 to include biogeochemists and biologists in 2009. One of the conference's most significant outcomes was the development of the Framework for Ocean Observing. The Framework provides guidance in the implementation of an integrated and sustained ocean observing system. It uses a systems approach that is designed to be flexible and to adapt to evolving scientific, technological, and societal needs toward delivering an ocean observing system with a maximized user base. The Framework shows how to respond to societal issues with science-driven plans, tools, and deployment strategies that will successfully address those issues. It further recognizes that to maintain a fit-for-purpose ocean observing system, the outputs (publications, products, ocean services) must properly address the issues that drove the original requirements. This system evaluation creates a constant feedback loop that ensures requirements are always science-driven and informed by societal needs.

Just a few month ago, OceanObs'19 assembled more that 1,500 ocean scientists, engineers, and users of ocean observing technologies from 74 countries and across many disciplines. Leading up to the conference, the community produced more than 120 community white papers. The overarching conference goal was to improve the governance of a global ocean observing system by including advocacy, funding, and alignment with best practices, and to designate responsibility for product definition that encompasses production and timely delivery at the appropriate scales (global, basin, regional, national) to serve user needs. The conference articulated a vision for ocean observing:

In recognition of the central role the ocean plays in supporting all life on Earth, we see a resilient world whose societies prosper through sustainable interactions with our ocean, guided by timely, reliable, and accessible information.

The conference also produced a declaration:

We, the participants of the decadal OceanObs'19 Conference, hear the call from maritime stakeholders, operational resource management agencies, and researchers from private and public organizations about the importance of more complete and sustained observations in the ocean globally. Information about the ocean is needed to advance the understanding of the ocean system, strengthen security and safety at sea, mitigate the risk of disasters including those related to a changing climate, reduce pollution and harmful debris, and inform efforts to conserve life in the sea for the benefit of future generations. It is required to design and support policy options that sustain ocean-related human benefits.

Followed by a call to the community:

In solidarity, we, the global ocean observing community and users of this information, invite all governments, international organizations, industries, scientists, engineers, stewards of ocean resources, members of civil society, Indigenous societies, youth and all of us who live, work and rely on the ocean to engage in a collective effort to evolve ocean observing to generate the data and information we need for the ocean we want.

Specifically, 10 dimensions of action were highlighted:

1. Engage observers, data integrators, information providers, and users from the scientific, public, private, and policy sectors in the continuous process of planning, implementation, and review of an integrated and effective ocean observing system.
2. Focus the ocean observing system on addressing critical human needs, scientific understanding of the ocean and the linkages to the climate system, real time ocean information services, and promotion of policies that sustain a healthy, biologically diverse, and resilient ocean ecosystem.
3. Harness the creativity of the academic research and engineering communities, and work in partnership with the private and public sectors to evolve sensors and platforms, better integrate observations, revolutionize information products about the ocean, and increase efficiency and reduce costs at each step of the ocean observing value chain.
4. Advance the frontiers of ocean observing capabilities from the coast to the deep ocean, including all aspects of the marine biome, disease vectors, pollutants, and exchanges of energy, chemicals and biology at the boundaries between the ocean and air, seafloor, land, ice, freshwater, and human populated areas.
5. Improve the uptake of ocean data in models for understanding and forecasting of the Earth system.
6. Ensure that all elements of the observing system are interoperable and that data are managed wisely, guided by open data policies, and that data are shared in a timely manner.
7. Use best practices, standards, formats, vocabularies, and the highest ethics in the collection and use of ocean data.
8. Involve the public through citizen-engaged observations, information products, outreach, and formal education programs.
9. Evolve ocean observing governance to learn and share, coordinate, identify priorities, increase diversity, promote partnerships, and resolve conflicts, through a process of continuing assessment to improve observing.
10. Promote investments in ocean observing and information delivery and sustain support.

OceanObs19: http://www.oceanobs19.net/

OceanObs19 Declaration: http://www.oceanobs19.net/wp-content/uploads/2019/09/OO19-Conference-Statement_online.pdf

Global Ocean Observing System: https://www.goosocean.org/

Framework for Ocean Observing: http://www.oceanobs09.net/foo/

A timely commentary from John Bell of the European Commission said, "Ocean Observing needs to develop from niche to norm. Something that needs all parts of society to be engaged in. Together we should recognize the benefits that ocean observation, information, and knowledge bring to all of us living, working and relying on the ocean."

In the months to come, the OceanObs'19 organizers and sponsors will launch several efforts to address issues around four themes and other areas of community action**. Information**: how do we meet future user needs? **Interoperability**: how can we better communicate among observing systems to deliver products for users that follow usability and other best practices across the globe? **Innovation**: how can we spur innovation in observing technologies, products, and user services? **Integration**: how can we balance user and operator needs, capabilities, and knowledge worldwide? There will be town halls at many ocean meetings during the next 12 months, and I am looking forward to seeing impactful changes in the way we cooperate, share, and resource ocean observing. How can we go from the niche of science and engineering to the norm of serving society with critical ocean information? The outcomes of this process will inform a growing GOOS and provide critical energy toward the UN Decade of Ocean Science for Sustainable Development (2021–2030). I am also sure it will have an impact on how we will advance and develop The Oceanography Society (TOS).

TOS supported the OceanObs19 process by publicizing the calls for community white papers and by contributing funds toward early career attendance, and we helped to organize a pre-conference early career workshop. During the conference, a TOS booth provided attendees with an opportunity to learn about TOS and to hear from the community about how TOS can support ocean observing in the future. I could imagine that in the future TOS might sponsor an award to recognize outstanding individuals or team initiatives in the area of sustained global ocean observing. A proposal for this award would go to the TOS Council and could become an item of discussion regarding TOS strategic development under the heading "TOS Strategy 2030," to be completed at the end of 2020.

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